Roll No. | 2 | 2 | 8 | 3 | 3 | 0 | 1 | 3 | 2 |

IET, Dr. Shakuntala Misra National Rehabilitation University,Lucknow,
Department of Electrical Engg.
Sessional Test – 1

Sem & Year: 4th & 2nd **Session: 2023-24**
Subject: Power Electronics **Code: TEE 402**
Duration: 90 Minutes **Max. Marks: 20**

Part A

Attempt all questions **(1×4=4 Marks)**

1. Which terminal does not belong to thyristors
   a. Anode
   b. Gate
   c. Cathode
   d. Base

2. In Reverse blocking mode of an SCR Junctions.....
   a. All are forward
   b. J1 & j3 reverse biased
   c. All are reversed
   d. NONE

3. SCR turns off when the
   a. Gate pulses are removed
   b. Gate pulses are applied
   c. The anode current is below holding current
   d. NONE

4. Typical ratio of latching & Holding current in SCR is
   a. 5 b. 1
   C 2.5 d. 0.5

Part B

Attempt any two Questions **(2×3=6 Marks)**

1. What do you mean by step of chopper? Draw a circuit diagram & derive the output equation.
2. What do you mean by the free-wheeling diode and its effect in PCR?
3. What do you mean by commutation & draw load commutation circuit?

Part C

Attempt any two Questions **(2×5=10 Marks**

1. Draw & Explain the working phenomenon of power MOSFET.
2. Draw a circuit diagram and waveform of a singal phase full wave rectifier with RL load.
3. Draw turn on characteristic of SCR in terms of Gate current, anode current & supply voltage.

SEMESTER EXAMINATION MAY-2024

Course Name: - BTech **Semester:- 4th**

Paper Name: - Power Electronics **Paper Code:- TEE-402**

Time - 3 Hrs + 20 minutes per hour extra time for V.I. & examinees with writer. **Max Marks-70**

समय– 3 घण्टे + 20 मिनट प्रति घंटे अतिरिक्त–दृष्टिबाधित एवं सह लेखक परीक्षार्थियों के लिए। अधिकतम अंक–70

Instructions:

- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries **3 mark. All questions are compulsory.**
- Section B- Answer any **5 out of 7** given questions in maximum one hundred fifty (150) words. Each question carries **7 marks.**
- Section C- Answer any **2 out of 3** given questions in maximum three hundred (300) words. Each question carries **10 marks.**

निर्देश:

- प्रश्न पत्र मे तीन खण्ड अ, ब, व स हैं। सभी खण्ड अनिवार्य हैं।
- खण्ड–अ मे प्रत्येक प्रश्न **तीन अंक** का है। **सभी प्रश्न अनिवार्य हैं।**
- खण्ड–ब मे **सात प्रश्नों में से किन्हीं पाँच** प्रश्नों के उत्तर अधिकतम 150 शब्दों में दें। प्रत्येक प्रश्न **सात अंक** का है।
- खण्ड–स मे **तीन प्रश्नों में से किन्हीं दो** प्रश्नों के उत्तर अधिकतम (250-300) शब्दों में दें। प्रत्येक प्रश्न **10 अंक** का है।

Section – A (खण्ड–अ)

Objective Questions(वस्तुनिष्ठ प्रश्न)

1. Answer all the following questions. **5x3 =15**

निम्नलिखित सभी प्रश्न अनिवार्य हैं।

i) Which of the given device is the fastest switching device

a) MOSFET

b) Triode

c) BJT

d) JEFT

ii) In the forward blocking mode of a silicon controlled rectifier, the SCR is

a)In on state

b)In natural state

c)Forward biased state

d)In off state

iii) The anode current passing through a conducting silicon-controlled rectifier is 20 A. If its gate current is made half, what will be the anode current?

a)10 A

b) 20 A

c) 5 A

d) 30 A

iv) Which of the given device is a modern semiconductor device that combines the characteristics of MOSFET and BJT?

a)SCR

b)Schottky diode

c)Microwave transistor

d) IGBT

v) A freewheeling diode is phase-controlled rectifiers.

a) Stops rectifier operations

b)Improves line power factor

c)Is the reason for additional harmonics

d)Is the reason for the sudden breakdown

Section – B (खण्ड–ब)

Short Answer Questions (लघुउत्तरीय प्रश्न)

2. Answer any five of the following questions in maximum 150 words. **5x7=35**

निम्नलिखित में से किन्हीं पाँच प्रश्नों के उत्तर अधिकतम 150 शब्दों में दें।

i. Draw VI characteristicsof SCR. And explain significance of gate current on turn on of SCR .

ii. Draw the diadram of MOSFETand mension the respetive terminals.

iii. Explain the role of drift region and freewheeling diode in power electronics devices.

iv. A 230 V, 50 Hz supply is connected to load resistance of 12Ω through half wave controlled rectifier. If the firing angle is 60 degree, Calculate Average output voltage.

v. Explain the operation of a three phase, fully controlled bridge converter with associated waveforms

vi. Explain working principle of single phase Full wave RLload,PCR in details with circuit diagram.

vii. Derive output voltage equation of step up chopper with help of circuit diagram

Section - C (खण्ड–स)

Descriptive Questions (विवरणात्मक प्रश्न)

3. Answer any two of the following question in maximum 300 words. **2x10=20**

निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर अधिकतम 300 शब्दों में दें।

i) Discuss in details various type of thyristor protection.with the help of diagram.

ii) What do you mean by commutation in power electronics.and explain load commutation.

iii) Discuss the turn off characteristics of SCR and explain the mechanism of turn OFF.

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